Chapter 11

Vertical Alignment Generator

11.1 Objectives

- Create and store vertical alignments using the **Vertical Alignment Generator**.

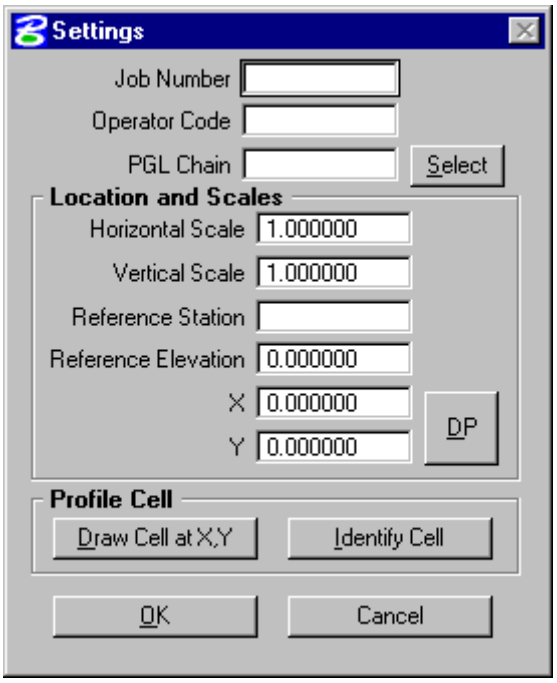
11.2 Definitions

The **Vertical Alignment Generator** is a GEOPAK tool that can graphically create and modify proposed design profiles or modify an existing ground profile. These operations may be accomplished through a dialog box and/or by dynamic manipulation of graphic elements.

A profile may also be created with Coordinate Geometry (COGO) input.

11.3 Accessing

Vertical Alignment Generator may be invoked by **Project Manager >> Vertical Alignment** or by the **Vertical Alignment Generator** icon.

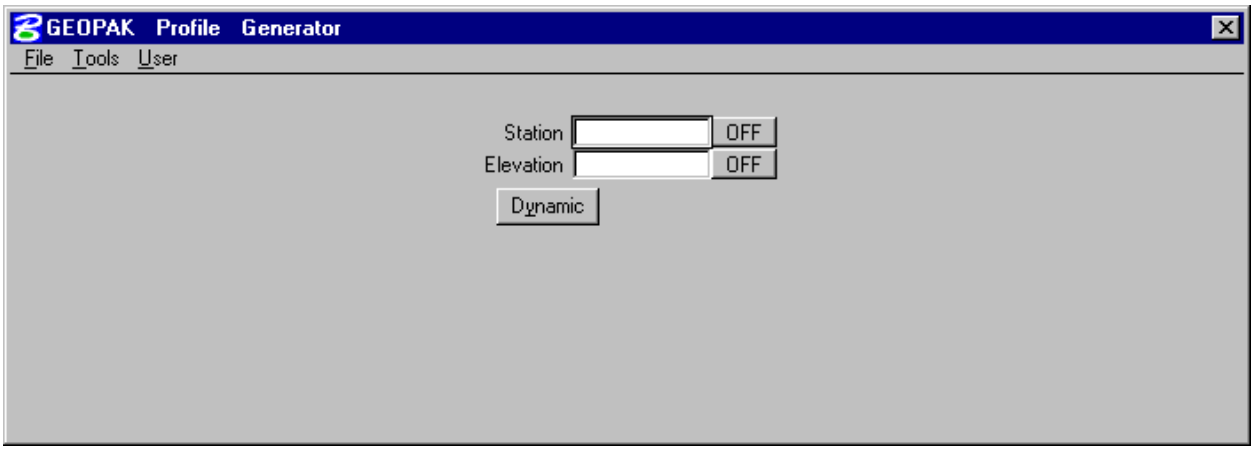


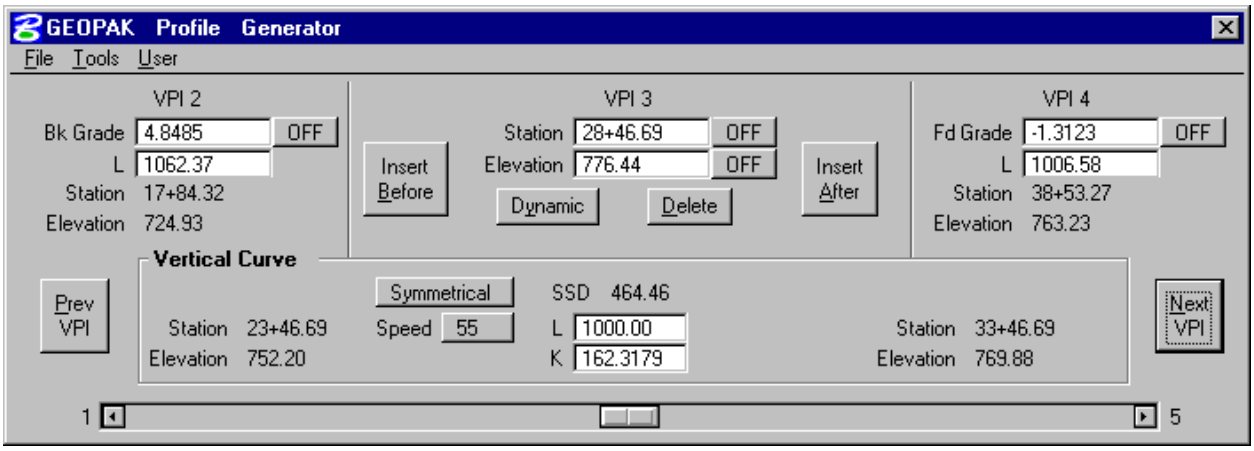
The first dialog box that appears is labeled **Settings**. The entries in this box set the parameters and define the location within the design file where the profile is to be displayed. All fields must be completed before the design process can begin. As the **OK** button is clicked, the Vertical Profile Generator dialog box will appear.

Choosing the **Identify Cell** button and selecting a profile cell can also fill in the information. If a profile cell does not exist, the **Draw Cell at X, Y** can be used to place a profile cell using the location and scale information provided in the dialog.

11.4 Dialog

This tool allows a user to load a previously stored profile or create a new profile. You will notice changes in the configuration of this dialog box as you design a vertical alignment.





Various design parameters must be defined prior to designing a new profile; we will discuss those as we look at the options provided under the three headers, **File**, **Tools**, and **User**.

11.4.1 File

Clear - clears the profile display from Microstation graphics and removes all VPI's from the dialog box.

Draw - write the graphic elements of the profile to the Microstation file.

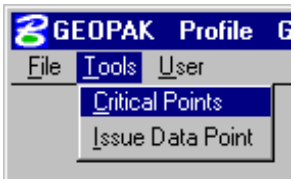
Load - retrieves a previously stored profile from the coordinate geometry database (.gpk)

Save - stores a new profile or updates (redefines) a previously stored profile under the same name.

Save As - is used to store the profile or to save a modified profile under a different name.

Exit - ends the process.

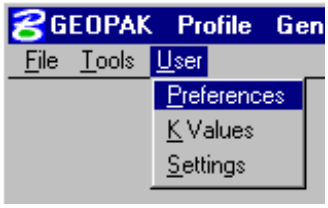
11.4.2 Tools



Critical Points - Vertical curves may also be defined by one or two critical points. If mathematically solvable, the vertical curve will be drawn and the design speed display adjusted to fit the current parameters.

Issue Data Point - Permits the user to type in stations and elevations, issue a data point that can be part of a Microstation place line, place a cell or perform another generic operations. This is useful in displaying visual references within the profile that need to be considered in design of the vertical profile.

11.4.3 User



Preferences - sets the rounding parameters for each of the items listed in the dialog box.

K Values - is a table of stopping sight distance K-values for crest and sag conditions for various design speeds. These values are based on the AASHTO Green Book.

Settings - recalls the **Settings** dialog box that first appeared upon initializing Vertical Layout.

11.5 Creating A New Profile

Step 1 Place the first VPI (Note: The enter key must be used to ensure values are accepted.)
Four options:

i. Type station and elevation of the VPI into dialog box
ii. Enter station of VPI as precision input (type in value) Elevation is defined through dynamic cursor placement on screen
iii. Elevation is defined via precision input Station is defined through dynamic cursor placement on screen
iv. Both values for the VPI can be established dynamically on screen

Step 2 Define ahead (or back tangent)
Station, elevation, grade and length parameters may be defined via precision input, dynamic manipulation or a combination of both.

Step 3 Define remaining VPI's and Grades
A repetition of the process from Step 2 with an option to insert VPI's between two existing VPI' s

Step 4 Define Vertical Curves
Simply define the design speed from the **Speed** option button and GEOPAK will reference the K-value table and draw the vertical curve. If a *curve overlap* occurs,

an overlap message will be displayed in the dialog box along with the overlap length.

Step 5 Adjusting Curve Lengths

The vertical curve can be modified by directly keying in either the K-value, curve length or design speed in the dialog box. You will see the displays in the dialog box automatically adjust to reflect the results of any modifications.

Step 6 Save the Profile

11.6 Precision Placement Options

Options available for creating or modifying vertical curves, VPI's and grade lines:

OFF - Values change.

INC (Increment) - Ensures that the designated profile parameter will be adjusted as defined in the Preferences dialog box.

LCK (Locked) - Forces all operations to maintain the designated profile parameters.